

X(1835) $I^G(J^{PC}) = ?^?(? - +)$

OMITTED FROM SUMMARY TABLE

Could be a superposition of two states, one with small width appearing as threshold enhancement in $p\bar{p}$, the other one with a larger width, decaying into $\pi^+\pi^-\eta'$. For the former ABLIKIM 12D determine $J^{PC} = 0(-+)$.

X(1835) MASS

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1835.7^{+ 5.0}_{- 3.2} OUR AVERAGE					
1836.5 \pm 3.0 ^{+ 5.6} _{- 2.1}		4265	1 ABLIKIM	11C BES3	$J/\psi \rightarrow \gamma\pi^+\pi^-\eta'$
1833.7 \pm 6.1 \pm 2.7		264	ABLIKIM	05R BES2	$J/\psi \rightarrow \gamma\pi^+\pi^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1832 ^{+ 19} _{- 5} ± 26			2 ABLIKIM	12D BES3	$J/\psi \rightarrow \gamma p\bar{p}$
1877.3 \pm 6.3 ^{+ 3.4} _{- 7.4}			3 ABLIKIM	11J BES3	$J/\psi \rightarrow \omega(\eta\pi^+\pi^-)$
1837 ^{+ 10} _{- 12} ± 9 _{- 7}		231	4,5 ALEXANDER	10 CLEO	$J/\psi \rightarrow \gamma p\bar{p}$
1831 ± 7			5,6 ABLIKIM	05R BES2	$J/\psi \rightarrow \gamma p\bar{p}$
1859 ^{+ 3} _{- 10} ± 5 _{- 25}			5 BAI	03F BES2	$J/\psi \rightarrow \gamma p\bar{p}$

1 From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two unconfirmed states $\gamma X(2120)$, and $\gamma X(2370)$, for $M(p\bar{p}) < 2.8$ GeV, and accounting for backgrounds from non- η' events and $J/\psi \rightarrow \pi^0\pi^+\pi^-\eta'$.

2 From the fit including final state interaction effects in isospin 0 S-wave according to SIBIRTSEV 05A.

3 The selected process is $J/\psi \rightarrow \omega a_0(980)\pi$. This state may be due also to $\eta_2(1870)$ or to a combination of $X(1835)$ and $\eta_2(1870)$.

4 From a fit of the $p\bar{p}$ mass distribution to a combination of $\gamma X(1835)$, γR with $M(R) = 2100$ MeV and $\Gamma(R) = 160$ MeV, and $\gamma p\bar{p}$ phase space, for $M(p\bar{p}) < 2.85$ GeV.

5 Evidence for a threshold enhancement in the $p\bar{p}$ mass spectrum was also reported by ABE 02K, AUBERT,B 05L, and WANG 05A in $B^+ \rightarrow p\bar{p}K^+$, WANG 05A in $B^0 \rightarrow p\bar{p}K_S^0$, ABE 02W in $\bar{B}^0 \rightarrow p\bar{p}D^0$, DEL-AMO-SANCHEZ 12 in $B \rightarrow D(D^*)p\bar{p}(\pi)$, and WEI 08 in $B^+ \rightarrow p\bar{p}\pi^+$ decays. Not seen by ATHAR 06 in $\Upsilon(1S) \rightarrow p\bar{p}\gamma$.

6 From the fit including final state interaction effects in isospin 0 S-wave according to SIBIRTSEV 05A. Systematic errors not estimated.

NODE=M085

NODE=M085

NODE=M085M

NODE=M085M

OCCUR=2

NODE=M085M;LINKAGE=AI

NODE=M085M;LINKAGE=AK

NODE=M085M;LINKAGE=BL

NODE=M085M;LINKAGE=AE

NODE=M085M;LINKAGE=HF

NODE=M085M;LINKAGE=AB

NODE=M085W

NODE=M085W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
99 ± 50 OUR AVERAGE Error includes scale factor of 2.8.					
190 ± 9 ^{+ 38} _{- 36}		4265	7 ABLIKIM	11C BES3	$J/\psi \rightarrow \gamma\pi^+\pi^-\eta'$
67.7 \pm 20.3 \pm 7.7		264	ABLIKIM	05R BES2	$J/\psi \rightarrow \gamma\pi^+\pi^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 76		90	8 ABLIKIM	12D BES3	$J/\psi \rightarrow \gamma p\bar{p}$
57 ± 12 ^{+ 19} _{- 4}			9 ABLIKIM	11J BES3	$J/\psi \rightarrow \omega(\eta\pi^+\pi^-)$
0 ^{+ 44} _{- 0}		231	10,11 ALEXANDER	10 CLEO	$J/\psi \rightarrow \gamma p\bar{p}$
< 153		90	11,12 ABLIKIM	05R BES2	$J/\psi \rightarrow \gamma p\bar{p}$
< 30			11 BAI	03F BES2	$J/\psi \rightarrow \gamma p\bar{p}$

7 From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two unconfirmed states $\gamma X(2120)$, and $\gamma X(2370)$, for $M(p\bar{p}) < 2.8$ GeV, and accounting for backgrounds from non- η' events and $J/\psi \rightarrow \pi^0\pi^+\pi^-\eta'$.

8 From the fit including final state interaction effects in isospin 0 S-wave according to SIBIRTSEV 05A.

9 The selected process is $J/\psi \rightarrow \omega a_0(980)\pi$. This state may be due also to $\eta_2(1870)$ or to a combination of $X(1835)$ and $\eta_2(1870)$.

10 From a fit of the $p\bar{p}$ mass distribution to a combination of $\gamma X(1835)$, γR with $M(R) = 2100$ MeV and $\Gamma(R) = 160$ MeV, and $\gamma p\bar{p}$ phase space, for $M(p\bar{p}) < 2.85$ GeV.

11 Evidence for a threshold enhancement in the $p\bar{p}$ mass spectrum was also reported by ABE 02K, AUBERT,B 05L, and WANG 05A in $B^+ \rightarrow p\bar{p}K^+$, WANG 05A in $B^0 \rightarrow$

OCCUR=2

NODE=M085W;LINKAGE=AI

NODE=M085W;LINKAGE=AK

NODE=M085W;LINKAGE=BL

NODE=M085W;LINKAGE=AE

NODE=M085W;LINKAGE=HF

$p\bar{p}K_S^0$, ABE 02W in $\bar{B}^0 \rightarrow p\bar{p}D^0$, DEL-AMO-SANCHEZ 12 in $B \rightarrow D(D^*)p\bar{p}(\pi)$, and WEI 08 in $B^+ \rightarrow p\bar{p}\pi^+$ decays. Not seen by ATHAR 06 in $\Upsilon(1S) \rightarrow p\bar{p}\gamma$.
 12 From the fit including final state interaction effects in isospin 0 S-wave according to SIBIRTSEV 05A. Systematic errors not estimated.

X(1835) DECAY MODES	
Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \quad p\bar{p}$	seen
$\Gamma_2 \quad \pi^+\pi^-\eta'$	seen

X(1835) BRANCHING RATIOS

$\Gamma(p\bar{p})/\Gamma(\pi^+\pi^-\eta')$	Γ_1/Γ_2		
VALUE	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
0.333	ABLIKIM	05R BES2	$J/\psi \rightarrow \gamma\pi^+\pi^-\eta'$

X(1835) REFERENCES

ABLIKIM	12D	PRL 108 112003	M. Ablikim <i>et al.</i>	(BES III Collab.)	REFID=54269
DEL-AMO-SA...	12	PR D85 092017	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)	REFID=54286
ABLIKIM	11C	PRL 106 072002	M. Ablikim <i>et al.</i>	(BES III Collab.)	REFID=53684
ABLIKIM	11J	PRL 107 182001	M. Ablikim <i>et al.</i>	(BES III Collab.)	REFID=53931
ALEXANDER	10	PR D82 092002	J.P. Alexander <i>et al.</i>	(CLEO Collab.)	REFID=53525
WEI	08	PL B659 80	J.-T. Wei <i>et al.</i>	(BELLE Collab.)	REFID=52086
ATHAR	06	PR D73 032001	S.B. Athar <i>et al.</i>	(CLEO Collab.)	REFID=50993
ABLIKIM	05R	PRL 95 262001	M. Ablikim <i>et al.</i>	(BES Collab.)	REFID=50985
AUBERT,B	05L	PR D72 051101	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=50827
SIBIRTSEV	05A	PR D71 054010	A. Sibirtsev, J. Haidenbauer		REFID=51038
WANG	05A	PL B617 141	M.-Z. Wang <i>et al.</i>	(BELLE Collab.)	REFID=50651
BAI	03F	PRL 91 022001	J.Z. Bai <i>et al.</i>	(BES II Collab.)	REFID=49473
ABE	02K	PRL 88 181803	K. Abe <i>et al.</i>	(BELLE Collab.)	REFID=48690
ABE	02W	PRL 89 151802	K. Abe <i>et al.</i>	(BELLE Collab.)	REFID=48980

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NODE=M085215;NODE=M085

DESIG=1;OUR EVAL; \rightarrow UNCHECKED \leftarrow
DESIG=2;OUR EVAL; \rightarrow UNCHECKED \leftarrow

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NODE=M085R01
NODE=M085R01

NODE=M085